



Newington College

2011

TRIAL HSC EXAMINATION

General Mathematics

General Instructions

- Reading time – 5 minutes
- Working time – 2½ hours
- Write using black or blue pen
- Board approved calculators may be used
- A formulae sheet is provided at the back of this paper

Total Marks – 100

Section I

Pages 2–9

22 marks

- Attempt Questions 1–22
- Allow about 30 minutes for this section

Section II

Pages 10–20

78 marks

- Attempt Questions 23–28
- Allow about 2 hours for this section

Section I

22 marks

Attempt Questions 1–22

Allow about 30 minutes for this section

Use the multiple-choice answer sheet for Questions 1–22.

1 A billion is one thousand million.

What is 2.86 billion written in scientific notation, correct to two significant figures?

- (A) 29×10^8
- (B) 2.9×10^9
- (C) 2.86×10^9
- (D) 28.6×10^8

2 To win a dice game, Michael must roll a double six.

What is the probability that Michael's roll is a double six?

- (A) $\frac{1}{6}$
- (B) $\frac{1}{12}$
- (C) $\frac{1}{18}$
- (D) $\frac{1}{36}$

3 $3a + b$ is deducted from double $(a - b)$.

Which is the result?

- (A) $a - 3b$
- (B) $a + 3b$
- (C) $-a - 3b$
- (D) $-a - b$

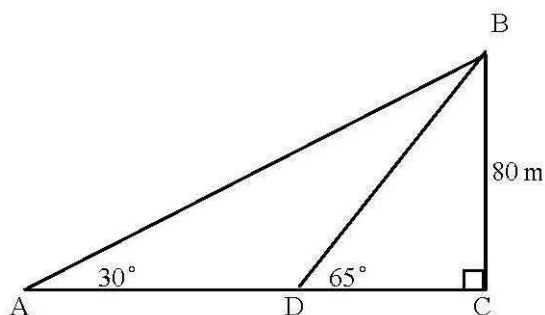
4 How far does a car moving at 60 km/h travel in the 9 seconds?

- (A) 60 m
- (B) 150 m
- (C) 166.6 m
- (D) 167 m

5 Which of the following correctly expresses L as the subject of $T = 2\pi\sqrt{\frac{L}{g}}$?

- (A) $L = 2\pi\sqrt{\frac{T}{g}}$
- (B) $L = \frac{gT^2}{4\pi}$
- (C) $L = \frac{2\pi g}{T^2}$
- (D) $L = \frac{gT^2}{(2\pi)^2}$

6 What is the length of AD (to the nearest metre)?



- (A) 228
- (B) 125
- (C) 101
- (D) 56

7 Hawksville Council used the ‘capture – recapture’ technique to estimate the number of myna birds in a local park.

- 36 myna birds were caught, tagged and released
- 6 weeks later, 24 myna birds were caught in the same area and 6 had been tagged.

What estimate should the council give for the total number of myna birds in the park?

- (A) 864
- (B) 216
- (C) 144
- (D) 60

8 The petroleum used to produce a single plastic shopping bag could drive a small car 10 km.

How many times could the car drive around the Equator (radius 6400 km) using the petroleum needed to make the 3.92×10^9 plastic shopping bags used each year?

- (A) 974 824
- (B) 9 748
- (C) 305
- (D) 3

9 Triangular chocolates come in four different sizes.

Which size is the best value for money?

- (A) 150 g for \$3.80
- (B) 200 g for \$4.99
- (C) 330 g for \$9.49
- (D) 600 g for \$15.00

10 Which city is closest to the Equator?

- (A) (34° S, 179° E)
- (B) (10° N, 10° W)
- (C) (5° S, 12° E)
- (D) (42° N, 5° W)

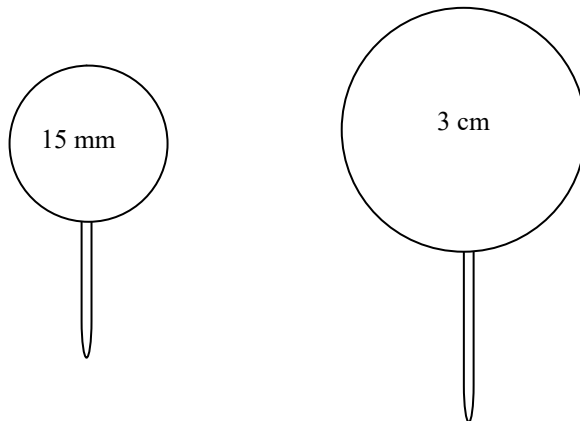
11 Andrea plays basketball with the Wolvettes.

In which quarter of last season, was she most consistent?

Points scored:	<i>Game 1</i>	<i>Game 2</i>	<i>Game 3</i>	<i>Game 4</i>	<i>Game 5</i>
(A) <i>First quarter</i>	9	15	15	22	10
(B) <i>Second quarter</i>	15	8	38	27	15
(C) <i>Third quarter</i>	18	5	16	7	3
(D) <i>Fourth quarter</i>	12	16	11	23	16

12 The diameters of two similar spherical lollypops are 15 mm and 3 cm.

What is the ratio of the smaller lollypop's volume to that of the larger lollypop?



- (A) 1 : 2
- (B) 1 : 4
- (C) 1 : 8
- (D) 3 : 4

- 13 Katie is decorating cupcakes for the school fete. Her efforts are shown in the table:

<i>Cupcakes</i>	<i>icing</i>	<i>frosting</i>
Sprinkles	16	28
Candies	10	16

Katie offers her little brother a cupcake.

What is the probability he selects a frosted cupcake?

- (A) $\frac{2}{5}$
- (B) $\frac{4}{11}$
- (C) $\frac{7}{11}$
- (D) $\frac{22}{35}$

- 14 A roadside store has 8 different vegetables available.

How many ways can Janice select 5 different vegetables?

- (A) 120
- (B) 56
- (C) 40
- (D) 13

- 15 John's results in the half-yearly assessment are shown in the table.

<i>Course</i>	<i>Class mean</i>	<i>Standard deviation</i>	<i>John's result</i>
English	78%	4	79%
Mathematics	65%	2	67%
History	75%	6	78%
Biology	71%	8	63%

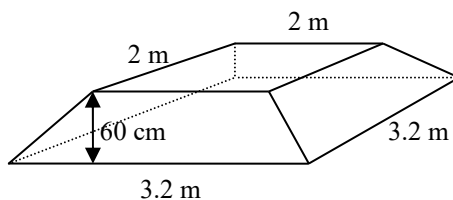
In which course did John perform the best?

- (A) English
- (B) Mathematics
- (C) History
- (D) Biology

- 16 Which of the following would be most likely to have a positive correlation?
- (A) A person's height and their hat size.
 (B) The price of movie tickets and the number of movie tickets sold.
 (C) Air temperature and the number of umbrellas sold.
 (D) The volume of loud party music and the number of noise complaints.
- 17 Darwin is at approximately $(12^\circ\text{S}, 130^\circ\text{E})$ and Rio de Janeiro at $(22^\circ\text{S}, 45^\circ\text{W})$. It is Wednesday 8 pm local time in Rio de Janeiro.

What is the day and local time in Darwin?

- (A) Wednesday 7:40 am
 (B) Wednesday 8:20 am
 (C) Thursday 7:40 am
 (D) Thursday 7:40 pm
- 18 To protect his vegetable garden Tom constructs a glass cover in the shape of a bottomless truncated square pyramid as shown:



What amount of glass is needed to make the cover?

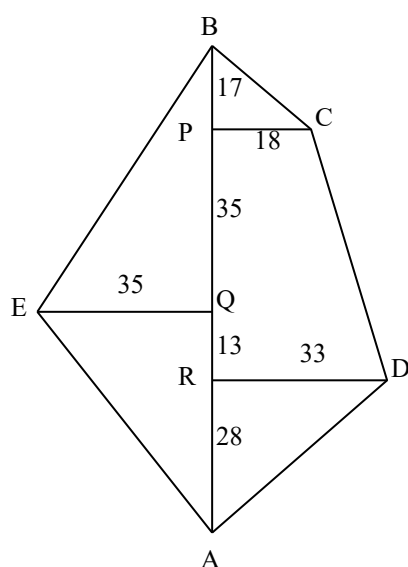
- (A) 6.24 m^2
 (B) 10.24 m^2
 (C) 16.48 m^2
 (D) 20.48 m^2

19 For an algebra test, a class has a mean of 60 and a standard deviation of 8.

A student sits the test later and scores 40.

What happens to the standard deviation of the marks?

- (A) decreases
- (B) increases
- (C) is unchanged
- (D) is now zero



20 What is the size of angle BEA in the diagram above?

- (A) $\tan^{-1}\left(\frac{35}{35}\right) + \tan^{-1}\left(\frac{13}{35}\right)$
- (B) $\tan^{-1}\left(\frac{52}{35}\right) + \tan^{-1}\left(\frac{41}{35}\right)$
- (C) $\tan^{-1}\left(\frac{35}{35} + \frac{13}{35}\right)$
- (D) $\tan^{-1}\left(\frac{52}{35} + \frac{41}{35}\right)$

- 21 \$250 is deposited into an investment account at the end of each month for two years. The account earns 4.8% pa interest, compounding monthly.

What is the amount, to the nearest dollar, in the account at the end of two years?

- (A) \$6284
- (B) \$6288
- (C) \$6512
- (D) \$10 838

- 22 The table shows monthly repayments for loans over 30 years.

		<i>Loan amount</i>					
		\$250 000	\$300 000	\$350 000	\$400 000	\$450 000	\$500 000
<i>Interest rate per annum</i>	5.0%	\$1343	\$1612	\$1881	\$2149	\$2417	\$2686
	5.5%	\$1420	\$1704	\$1988	\$2272	\$2556	\$2840
	6.0%	\$1500	\$1800	\$2100	\$2399	\$2700	\$3000
	6.5%	\$1583	\$1899	\$2217	\$2532	\$2849	\$3165
	7.0%	\$1665	\$1998	\$2331	\$2665	\$2997	\$3330
	7.5%	\$1749	\$2099	\$2449	\$2798	\$3148	\$3498

Howard borrowed \$400 000 over a period of 30 years, making monthly repayments according to the table. He calculates that on making the last repayment he would have paid \$511 520 in interest.

What is Howard's monthly repayment?

- (A) \$1420
- (B) \$2272
- (C) \$2399
- (D) \$2532

Section II

78 marks

Attempt Questions 23–28

Allow about 2 hours for this section

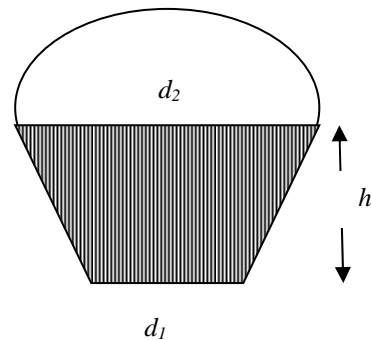
Answer each question in the appropriate writing booklet. Extra writing booklets are available. All necessary working should be shown in every question.

Question 23 (13 marks) Start a new page for your answers.

All necessary working should be shown in every question.

(a) The volume, in cubic centimetres, of a cupcake is given by the formula

$$V = 1.5\pi h \left(\frac{d_1 + d_2}{4} \right)^2$$



where h is the height of the paper patty case,

d_1 is the base diameter of the paper patty case, and

d_2 is the top diameter of the paper patty case.

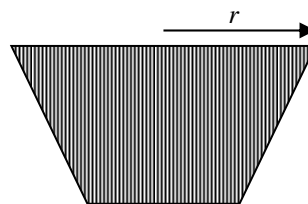
- (i) Calculate the volume of a cupcake made in a patty case with dimensions: 2
- base diameter 3.2 cm
 - top diameter 5 cm
 - height 2 cm
- (ii) A similar (larger) paper patty case with a volume of 175 cm^3 has 2
diameters of 5.2 cm and 8.2 cm.

Calculate the height of this larger patty case, to the nearest millimetre.

Question 23 continues on page 11

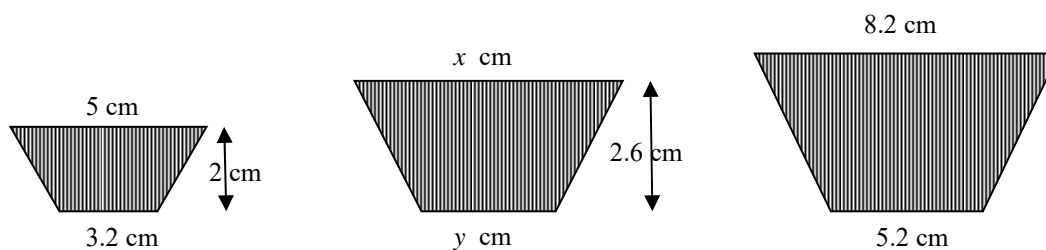
Question 23 (continued)

- (b) The area iced on a cupcake is given by $A = 2\pi r^2$ where r is the radius of the top of the patty case. 2



Calculate, to 2 decimal places, the area iced on two cupcakes made in patty cases with diameters of 5 cm and 8.2 cm.

- (c) A similar patty case has a height of 2.6 centimetres.



- (i) Write a proportionality statement and use it to show that the top diameter (x) of this 'medium-sized' patty case is 6.5 cm. 2
- (ii) Calculate the base diameter (y) of this 'medium-sized' patty case. 2

- (d) Jason says the best part of a cupcake is the icing.

SRC CAKE STALL

Small 50c each

Medium \$1 each

Large \$2 each

By calculating the iced area on a medium-sized cupcake and comparing it to your answers in part (b), determine the combination of cupcakes Jason should buy to get the most icing for his \$3.00. 3

End of Question 23

Question 24 (13 marks) Start a new page for your answers.

All necessary working should be shown in every question.

- (a) In 2003 an Australian attempt on the world record for the longest knitted scarf was commenced.

The approximate length of scarf knitted in any year of the challenge is proportional to the square of the year of the challenge as shown in the table.

Year (n)	1	2	3	4	5	B
Length (L)	582	2328	A	9312	14 550	28 518

This relationship is given as:

$$L = 582n^2 \quad \text{where } n \text{ was the year of the challenge.}$$

Determine the values of **A** and **B** in the table.

2

- (b) The progressive length of the scarf, T , after n years is given by the formula:

$$T = 97n \times (n + 1) \times (2n + 1)$$

- (i) Calculate the progressive length of the scarf after 5 years. 2
- (ii) By trial and error, determine the number of years it would have taken to equal the latest world record, of just over 52.9 kilometres, set in 2005. 2
- (c) Over 1400 knitters participated in the Australian challenge.

If the ratio of male to female knitters is 3 : 7 what is the probability that two knitters chosen at random are both male or both female? 2

Question 24 continues on page 13

Question 24 (continued)

- (d) The number of people, P , participating in the knitting challenge is given by:

$$P = 10 \times (2.718)^n \quad \text{where } n \text{ represents the year of the challenge.}$$

Complete Question 24 (d) on the answer sheet supplied.

- (i) Complete the table of values for $P = 10 \times (2.718)^n$ **2**

- (ii) Draw a neat sketch of the data. **2**

Use the horizontal axis to represent the year and the vertical axis to represent the number of people.

- (iii) Use your graph, or a calculation, to determine the number of people **1**
participating after $2\frac{1}{2}$ years.

End of Question 24

Question 25 (13 marks) Start a new page for your answers.

All necessary working should be shown in every question.

The back-to-back stem and leaf plot shows the number of internet downloads per day made by students in a study group.

girls					boys				
	9	6	3	0	2	3			
		5	5	1	0	4	6		
6	2	1	0	2	2	2	3	5	8
	7	5	1	3	2	5			
		9	3	4	5	7			
				5	2	⊛			

- (a) The range of scores for the study group is 54. 1
What number is represented by ⊛?
- (b) Which group, boys or girls, has the higher mode and by how much? 2
- (c) Calculate the difference between the median for each group. 2
- (d) Calculate the mean and standard deviation for the girls group. 2
Give answers to one decimal place.

Question 25 continues on page 15

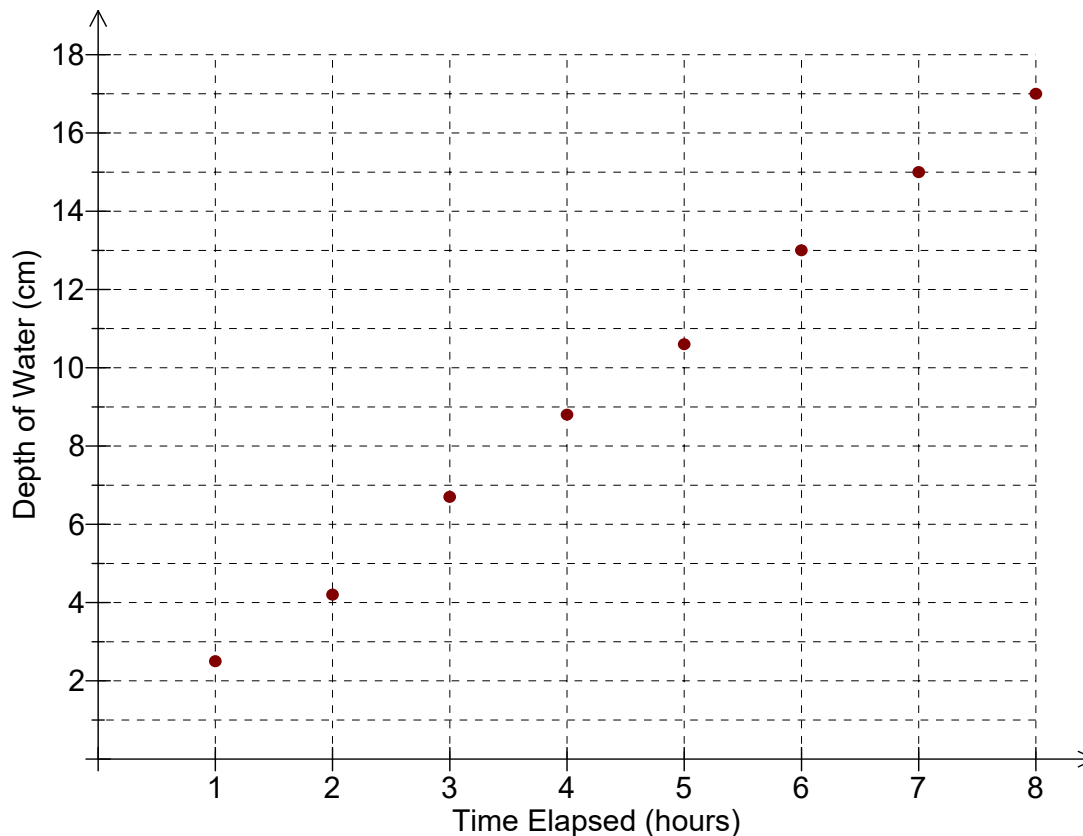
Question 25 (continued)

All necessary working should be shown in every question.

Complete Question 25 (e) on the answer sheet supplied.

- (e) Measurements were taken of the depth of water as a tap dripped into an empty container.

Water Level



- (i) What depth of water was in the container before the first reading was taken? **1**
- (ii) By drawing a line of best fit through the points, what is the gradient of the line of best fit? **2**
- (iii) Write a possible equation for the line of best fit. **1**
- (iv) What depth of water, according to your line of best fit, would be in the container after 20 hours? **1**
- (v) Give the name of a possible geometrical shape for the container. **1**

End of Question 25

Question 26 (13 marks) Start a new page for your answers.

All necessary working should be shown in every question.

- (a) Raymond earned \$49 920 in paid employment last financial year. He also received \$264 in bank interest and \$183 in share dividends. He is entitled to claim 3 950 km at 45.7c/km in work related travel; union fees of \$582 and other work related expenses of \$497.

(i) Calculate the total of Raymond's allowable deductions. 2

(ii) Determine Raymond's taxable income. 1

- (b) The table below gives the personal income tax rates.

<i>Taxable income (\$)</i>	<i>Tax payable</i>
\$0 – \$13 000	Nil
\$13 001 – \$32 000	Nil plus 25 cents for each \$1 over \$13 000
\$32 001 – \$55 000	\$4750 plus 35 cents for each \$1 over \$32 000
\$55 001 – \$100 000	\$12 800 plus 45 cents for each \$1 over \$55 000
Over \$100 00	\$33 050 plus 55 cents for each \$1 over \$100 000

(i) Find the tax payable on a taxable income of \$63 000. 2

(ii) Justine pays \$10 350 in tax. Use the table to calculate her taxable income. 3

Question 26 continues on page 16

Question 26 (continued)

All necessary working should be shown in every question.

(c) A survey asking about study habits produced the following results:

<i>Hours of study per week</i>	<i>boys</i>	<i>girls</i>	<i>total</i>
Less than 12 hours	35	20	B
12 hours or more	75	A	145
total	110	90	200

- (i) State the values of **A** and **B** missing from the two-way table. **1**
- (ii) What fraction of girls surveyed studied less than 12 hours per week? Give your answer as a simplified fraction. **1**
- (iii) What percentage of students studied less than 12 hours per week? **1**
- (iv) What percentage of students studying more than 12 hours per week were boys? **1**
- (v) What is the probability that a student chosen at random studies at least 12 hours per week? **1**

End of Question 26

Question 27 (13 marks) Start a new page for your answers.

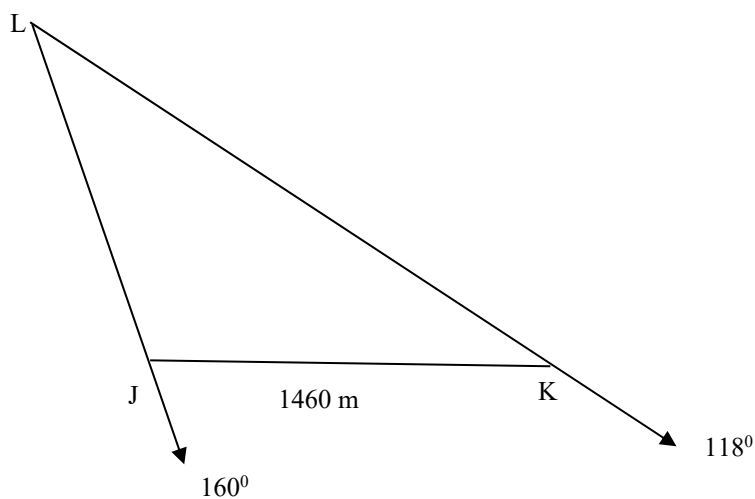
All necessary working should be shown in every question.

(a) Simon walks 3 kilometres due west, then 4 kilometres south-west.

(i) Draw a neat sketch showing Simon's journey. 1

(ii) Find the distance Simon is from his starting point, in a straight line, correct to one decimal place. 2

(b) Given the bearing from L to K is 118° , the bearing from L to J is 160° . K is east of J and the distance from J to K is 1460 m.



(i) Find the size of $\angle LJK$. 1

(ii) Calculate the size of $\angle JLK$ and hence the distance LK to the nearest metre. 3

(iii) Find the area of $\triangle JKL$, to the nearest square metre. 2

Question 27 continues on page 18

Question 27 (continued)

- (c) A hat contains seven cards numbered as follows:



A card is chosen at random from the hat.

1

What is the probability that the card has an even number?

- (d) (i) Two cards are chosen at random, the first **not** being replaced before the second is drawn, and the numbers added.

The table shows some of the possible totals.

		First card						
		1	2	3	5	8	13	21
Second card	1							
	2							
	3							
	5							
	8							
	13							
	21							
		1	2	3	5	8	13	21
	1	3	4	6	9	14	22	
	2	3	5	7	10	15	23	
	3	4	5	8	11	16	24	
	5	6	7	8	13	B	26	
	8	9	10	11	13	21	29	
	13	A	15	16	18	21	34	
	21	22	23	24	26	29	34	

Complete the missing sums for A and B.

1

- (ii) What is the probability that the sum of the two cards selected is:

(α) less than 6?

1

(β) more than 13?

1

End of Question 27

Question 28 (13 marks) Start a new page for your answers.

All necessary working should be shown in every question.

(a) When buying into a concrete edging business Sandra receives the following advice. She has: 1

- 70% chance of a \$40 000 profit
- 20% chance of breaking even
- 10% chance of losing \$15 000

Sandra invests \$20 000 and sets her son, Marcus, up to run the business.

Determine Sandra's average expected return.

(b) As part of the business Marcus purchases an edging machine. He takes out a loan for \$4 000 at 8.4% pa with reducible monthly interest.

(i) Explain why 0.007 should be used to calculate the monthly interest. 1

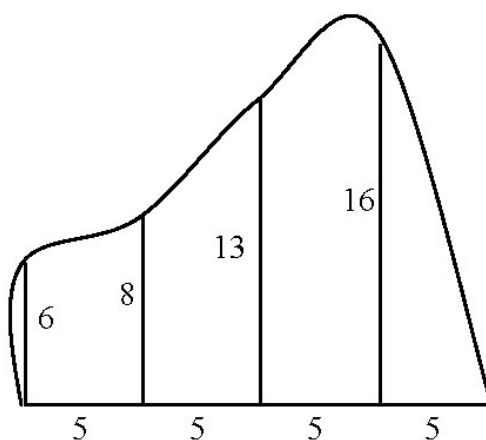
(ii) Marcus plans to pay off the loan in 9 months and uses the 'present value of an annuity' formula with $N = 4\,000$ and $n = 9$. 2

Calculate the monthly repayment, M , needed to pay off the loan in 9 months.

Question 28 continues on page 20

Question 28 (continued)

- (c) The diagram shows the cross-section of the concrete edging.



- (i) Use two applications of Simpson's Rule to determine the area of the cross-section. All measurements are in centimetres. **3**
- (ii) The edging is to be placed on both sides of a driveway which is 11.5 metres long. **2**
- Calculate the volume of concrete required, in cubic metres.
- (iii) Concrete costs \$110/m³ plus \$60 delivery. A surcharge of \$50 applies to orders under 5 m³. **2**
- Calculate the minimum cost to have the concrete for the edging job delivered.
- (d) The edging machine cost \$6 500 when new and depreciates at 15% of its value each year. **2**
- How many years, using the straight-line method of depreciation, until the value of the machine is less than \$2 000?

End of paper

2011 General Mathematics HSC Trial Marking Guidelines

Section I — MULTIPLE CHOICE ANSWERS

Question	Answer	Outcome Assessed	Question	Answer	Outcome Assessed
1	B	M1 P2 P7	12	C	M5 H2 H3
2	D	PB2 P10 H10	13	D	DA5 PB4 H4 H5
3	C	AM1 P2	14	B	PB3 H3 H4
4	B	M1 P2	15	B	DA6 H4
5	D	AM3 H2 H3	16	D	DA7 H4 H5
6	C	M6 H2 H6	17	C	M7 H6 H7
7	C	DA2 P9	18	B	M2 M5 H6
8	A	M1 M7 P2 H6 H7	19	A	DA5 H4 H5
9	B	M1 P2 P7	20	B	M6 H6 H7
10	C	M7 H6 H7	21	A	FM4 H2 H8
11	D	DA5 H4	22	D	FM4 H2 H8

Section II

Question 23

Part	Answer	Mark	Outcome Assessed
(a)(i)	$V = 1.5\pi \times 2 \left(\frac{3.2+5}{4} \right)^2$ $= 39.6 \text{ cm}^3$	1 1	AM3 H2 H3
(a)(ii)	$175 = 1.5\pi \times h \left(\frac{5.2+8.2}{4} \right)^2$ $175 = 52.884785h$ $h = 3.3$ <p>\therefore height is 3.3 cm</p>	1 1	AM1 H3
(b)	<p>For a diameter of 5 cm, $r = 2.5$ cm,</p> $A = 2\pi(2.5)^2$ $= 39.27 \text{ cm}^2$ <p>For a diameter of 8.2 cm, $r = 4.1$ cm,</p> $A = 2\pi(4.1)^2$ $= 105.62 \text{ cm}^2$	1 1	AM3 M5 H2 H3
(c)(i)	$\frac{x}{5} = \frac{2.6}{2}$ $x = 1.3 \times 5$ $= 6.5 \text{ cm}$	1 1	M3 P6
(c)(ii)	$\frac{y}{3.2} = \frac{2.6}{2}$ $y = 1.3 \times 3.2$ $= 4.16 \text{ cm}$	1 1	M3 P6
(d)	<p>Medium cupcake icing: $A = 2\pi \left(\frac{6.5}{2} \right)^2$</p> $= 66.37 \text{ cm}^2$ <p>Small – 39.27 cm^2 for 50c $\rightarrow 0.7854 \text{ cm}^2/\text{c}$</p>	1	AM3 M5 H2 H3

	Medium – 66.37 cm^2 for \$1 $\rightarrow 0.6637 \text{ cm}^2/\text{c}$ Large – 105.62 cm^2 for \$2 $\rightarrow 0.5281 \text{ cm}^2/\text{c}$ \therefore Jason gets more icing if he buys 6 small cupcakes	1 1	
--	--	--------	--

Question 24

(a)	$A = 582 \times 3^2 = 5238$ $28518 = 582 \times B^2$ $B^2 = 49$ $B = 7$	1 1	AM3 AM5 H2 H3 H5														
(b)(i)	$T = 97 \times 5 \times 6 \times 11$ $= 32\,010 \text{ m}$	1 1	AM3 H2 H3														
(b)(ii)	$52\,900 = 97n \times (n + 1) \times (2n + 1)$ Try $n = 7$, $97 \times 7 \times 8 \times 15 = 81\,480$ too big Try $n = 6$, $97 \times 6 \times 7 \times 13 = 52\,962$ \therefore 6 years to beat record	1 1	AM3 H3 H7														
(c)	$P(\text{male, male}) + P(\text{female, female})$ $= \frac{3}{10} \times \frac{3}{10} + \frac{7}{10} \times \frac{7}{10}$ $= \frac{9}{100} + \frac{49}{100}$ $= \frac{29}{50}$ or 58%	1 1	PB3 H3 H10														
(d)(i)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>n</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>P</td> <td>10</td> <td>27</td> <td>74</td> <td>201</td> <td>546</td> <td>1483</td> </tr> </table>	n	0	1	2	3	4	5	P	10	27	74	201	546	1483	2	AM3 AM5 H2 H3 H5
n	0	1	2	3	4	5											
P	10	27	74	201	546	1483											
(d)(ii)	<p style="text-align: center;">Year of challenge</p>	2	AM4 H2 H3														
(d)(iii)	$P = 10 \times (2.718)^{2.5} \approx 122$	1	AM3 AM4 H3														

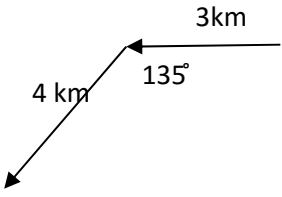
Question 25

(a)	$54 + 2 = 56 \therefore \star = 6$	1	DA5 H2
(b)	Girls mode is 15, boys 22. \therefore boys have higher mode by 7	1 1	DA3 DA5 H2
(c)	Median for girls is 21.5, median for boys is 24 Difference = 2.5	1 1	DA3 DA5 H2
(d)	Girls: mean is 23.7, stand. deviation is 13.4	2	DA5, H4
(e)(i)	Zero centimeters as it was empty	1	
(e)(ii)	$m = \frac{13}{6}$ or 2.166666 or 2.2 Accept any answer greater than 2 but less than 2.5	2	
(e)(iii)	$D = \frac{13}{6}t$ Accept any correct answer using gradient from part (ii)	1	
(e)(iv)	$D = \frac{13}{6} \times 20 = 43\frac{1}{3} \text{ cm}$	1	
(e)(v)	Any cylinder or prism with a constant cross-section	1	

Question 26

(a)(i)	$3950 \times 0.457 + \$582 + \$497 = \$2884.15$	2	FM3 P2
(a)(ii)	$\$49\,920 + \$264 + \$183 - \$2884.15 = \$47\,482.85$	1	FM3 P2
(b)(i)	$(63\,000 - 55\,000) \times 0.45 + \$12\,800 = \$16\,400$	2	FM3 P2
(b)(ii)	\$10 350 is in the 32001 – 55000 bracket. $\therefore 10\,350 = (N - 32\,000) \times 0.35 + 4750$ Thus, $(N - 32\,000) \times 0.35 = 5600$ $N - 32\,000 = 16\,000$ $N = 48\,000$	1 1 1	FM3 AM3 P2 H2
(c)(i)	A = 70 B = 55	1	PB4 H2
(c)(ii)	$\frac{20}{90} = \frac{2}{9}$	1	PB4 H2
(c)(iii)	$\frac{55}{200} = 27.5\%$	1	PB4 H2
(c)(iv)	$\frac{75}{145} = 51.7\%$	1	PB4 H2
(c)(v)	$\frac{145}{200} = \frac{29}{40}$	1	PB4 H2

Question 27

(a)(i)		1	M6 H6
(a)(ii)	$d = \sqrt{3^2 + 4^2 - 2 \times 3 \times 4 \times \cos 135^\circ}$ $= 6.48 \text{ km}$	1 2	M6 H6
(b)(i)	$\angle LJK = (360 - 340) + 90 = 110^\circ$	1	M6 H6
(b)(ii)	$\angle JLK = 340^\circ - 298^\circ = 42^\circ$ $\frac{LK}{\sin 110^\circ} = \frac{1460}{\sin 42^\circ}$ $\therefore LK = \frac{1460 \sin 110^\circ}{\sin 42^\circ}$ $= 2050 \text{ m}$	1 1 1	M6 H6 H7
(b)(iii)	$\angle JKL = 28^\circ$ $A = \frac{1}{2} \times 1460 \times 2050 \times \sin 28^\circ$ $= 281026 \text{ m}^2$	1 1	M6 H6 H7
(c)	$P(\text{even no.}) = \frac{2}{7}$	1	PB2 P10
(d)(i)	A = 14 B = 18	1	PB3 H4 H10
(d)(ii) (α)	$\frac{6}{6 \times 6} = \frac{1}{6}$ or count outcomes from table	1	PB3 H10
(d)(ii) (β)	$\frac{22}{6 \times 6} = \frac{11}{18}$ or count outcomes from table	1	PB3 H10

Question 28

(a)(i)	$0.7 \times \$40\,000 - 0.1 \times \$15\,000 = \$26\,500$	1	PB4 H4
(b)(i)	$8.4\% p.a. = \frac{8.4}{12}\% \text{ per month}$ $= 0.7\%$ $= 0.007$	1	FM5 H2 H5
(b)(ii)	$4000 = M \left[\frac{(1+0.007)^9 - 1}{0.007(1+0.007)^9} \right]$ $4000 = M \times 8.6929182$ $M = 4000 \div 8.6929182$ $= \$460.14$	1	FM5 H2 H8
(c)(i)	$A = \frac{5}{3}(7 + 4 \times 8 + 13) + \frac{5}{3}(13 + 4 \times 16 + 0)$ $= \frac{5}{3}(53 + 78)$ $= 215 \text{ cm}^2$	1 1 1	M5 H2 H6
(c)(ii)	$2 \times 215 \times 11\,500 = 4\,945\,000 \text{ cm}^3$ $= 4.945 \text{ m}^3$	1 1	M1 M5 H3
(c)(iii)	$4.945 \times \$110 + \$50 + \$60 = \653.95 <p>By ordering 5 m^3 to avoid the surcharge, $\\$110 \times 5 + \\$60 = \\$610$ which is $\\$43.95$ cheaper. \therefore order 5 m^3</p>	1 1	M2 M5 H7 H11
(d)	$6500 - n(0.15 \times 6500) \approx 2000$ $6500 - 975n \approx 2000$ $975n \approx 2000$ $n \approx 4.6$ <p>\therefore after 5 years machine is worth $< \\$2\,000$</p>	1 1	FM6 H2 H5